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MEMO

TO: **Tom Keefe**

FROM: **Steve Piper**

Cc: **Ron Kenny**

DATE: **April 2, 2008**

RE: **Chelsea Terminal Residual Tank Vent Testing**

On several occasions from September thru November 2007 air sampling and testing was conducted to characterize emissions from the residual oil storage tanks as a means to understand why the bed life of the odor control device (dry scrubber) was shorter than anticipated. During the control inlet testing efforts there was little or no activity with residual oil truck loading. As such, the emission measured reflected only working and breathing losses for the residual oil storage tanks.

Initial testing involved the collection of bag samples from the headspace of residual oil tanks and corresponding samples at the inlet of the odor control system. The bag samples were then taken to a nearby lab for analysis using Method 25A (calibrated to propane). Results of the sample analyses are summarized below.

Date	Tank Headspace* (ppm)	Emission Control Inlet (ppm)
Sept 19, 2007	5,700	1,660
Sept 26, 2007	3,900	1,400
Oct 15, 2007	2,750	825
Oct 18, 2007	4,595	802
Oct 22, 2007	2,910	-
Oct 29, 2007	2,990	670
Nov 5, 2007	3,660	820
Nov 28, 2007	2,145	632
AVG	3,456	973
Range	638 – 8,100	632-1,670

*Average of results from multiple tanks.

The average headspace concentration in the residual oil tanks of 3,456 ppm was slightly lower than the average headspace concentrations in the residual oil trucks during loading of 4,437 ppm. The difference seems rationale given that the truck were testing during an active top loading event whereas the majority of tank samples were collected during

periods with a range of conditions from empty with the heat off to active loading and air sparging at high temperatures.

The flow rate at the odor control inlet was measured on a few occasions with results ranging from 4,300 to 4,900 SCFM. To calculate potential emissions from the residual storage tanks, we used the flow rate of 4,300 SCFM and a maximum potential inlet concentration of 2,000 ppm (as propane). To convert from VOC concentration (ppm) to annual quantity of VOC emissions the ideal gas law for a standard air temperature was used. The worst case concentration of 2,000 ppm was reflects a 20% safely factor from the highest actual inlet concentration measured of 1,670 ppm and is consistent the concentration from the residual truck loading operation also going to the odor control system. Based on the 2,000 ppm potential concentration, the potential uncontrolled VOC emissions (as propane) from working and breathing losses from the residual oil storage tanks would be 258 tpy.

$$\frac{2{,}000\ ft^3}{10^6\ ft^3} * \frac{4{,}300\ ft^3}{min} * \frac{60\ min}{hour} * \frac{8{,}760\ hr}{year} * \frac{lb\ mole}{385\ ft^3} * \frac{44\ lb}{lb\ mole} * \frac{1\ ton}{2{,}000\ lb} = 258\ tpy$$

Calculating the residual oil tank working and breathing emissions using the traditional TANKS model published by EPA indicated that the potential VOC emissions from the seven heated tanks at Chelsea Terminal would only be 1.0 tpy.

Based on the emission control strategy being proposed of 95% capture efficiency and 99% VOC destruction efficiency of the captures vapors, the controlled potential emissions would be 15.4 tpy from residual oil tanks.